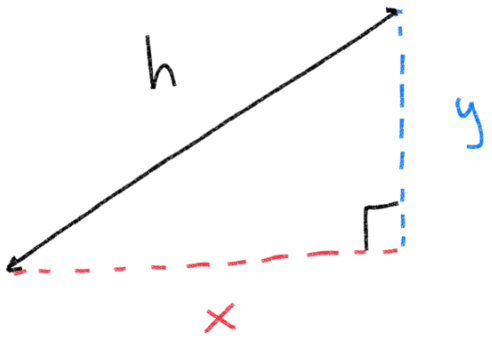
MTH-PC Pre-Calculus Session 12 10/20

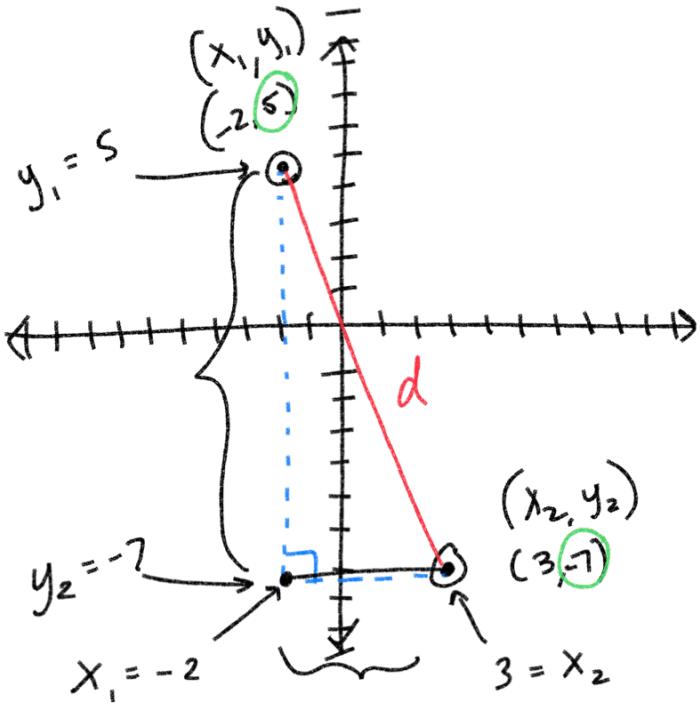


Pythagorean Theorem

$$a^2 + b^2 = c^2$$

$$x^2 + y^2 = h^2$$

$$(x_2 - x_1)^2 + (y_2 - y_1)^2 = d^2$$



$-7 - 5 = -12$ $\quad$ $3 - (-2) = 5$

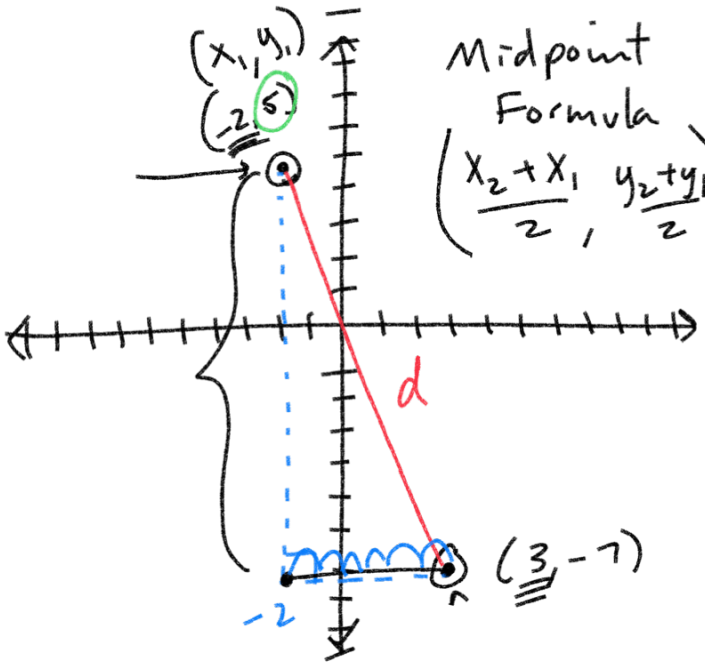
$(y_2 - y_1)$ $\quad$ $(x_2 - x_1)$

$-2 - 3 = -5$

$$\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} = d$$ Distance Formula

$$\sqrt{(3-(-2))^2 + (-7-5)^2} = \sqrt{5^2 + (-12)^2} = \sqrt{25+144}$$

$$\sqrt{169} = \boxed{13}$$



Midpoint Formula

$$\left(\frac{x_2 + x_1}{2}, \frac{y_2 + y_1}{2}\right)$$

Midpoint between $(-2, 5)$ and $(3, -7)$

$$\Rightarrow \frac{x_2 + x_1}{2} \quad \frac{y_2 + y_1}{2}$$

$$\frac{3 + (-2)}{2} \quad \frac{-7 + 5}{2}$$

$$\left(\frac{1}{2}, \frac{-2}{2}\right)$$

$$\left(\frac{1}{2}, -1\right)$$

Find the distance and the midpoint between the two points $(-2,-7)$ and $(4,1)$

Distance formula

$$d = \sqrt{(x_2-x_1)^2 + (y_2-y_1)^2}$$

$$\sqrt{(-2-4)^2 + (1-(-7))^2}$$

$$\sqrt{(-6)^2 + (8)^2}$$

$$\sqrt{36 + 64}$$

$$\sqrt{100} = \boxed{10}$$

Midpoint

$$\left(\frac{x_2+x_1}{2}, \frac{y_2+y_1}{2}\right)$$

$$\left(\frac{-2+4}{2}, \frac{1+(-7)}{2}\right)$$

$$\left(\frac{2}{2}, \frac{-6}{2}\right)$$

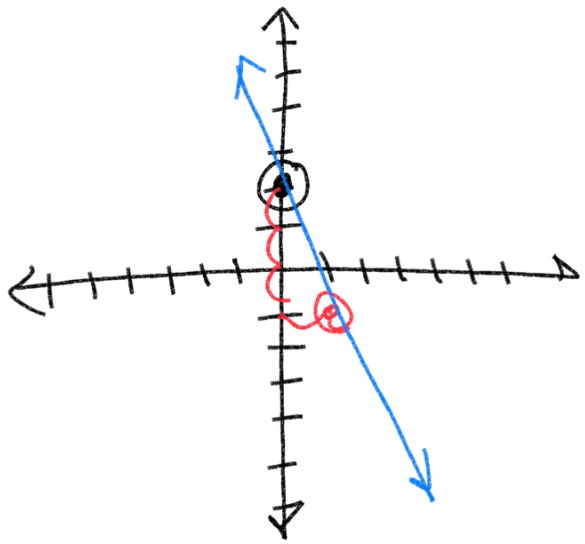
$$\boxed{(1,-3)}$$

$y = -3x+2$

$y = mx+b$

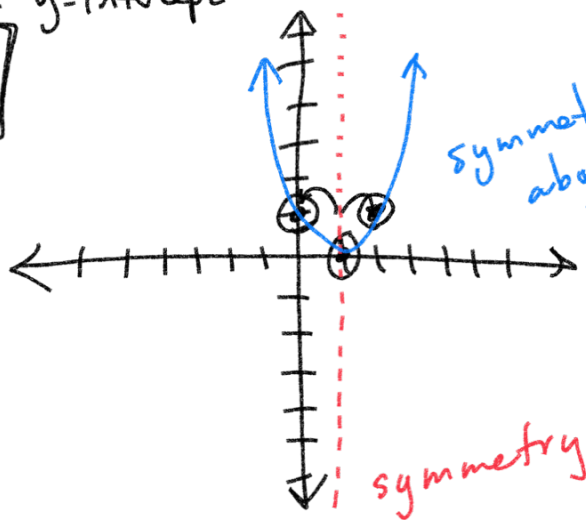
slope y-int

slope $= \frac{-3}{1} = \frac{\text{rise}}{\text{run}}$



$y = x^2 - 2x + 1$ ← y-intercept

parabola



Points
- y-int
- x-int
- vertex

symmetry about the vertex

y-intercept

$x = 0$

$y = (0)^2 - 2(0) + 1$

$y = 1$

x-intercept(s)

$y = 0$

$0 = x^2 - 2x + 1$

$0 = (x-1)(x-1)$

$x - 1 = 0$ $\quad$ $x - 1 = 0$

$+1 \quad +1$ $\quad$ $+1 \quad +1$

$x = 1$ $\quad$ $x = 1$

Symmetry

$x = y^2 + 4$

$-4 \quad -4$

$\sqrt{y^2} = \sqrt{x-4}$

$y = \pm\sqrt{x-4}$

$x = y^2 + 4$

$y = 3$

$x = 3^2 + 4$

$9 + 4 = 13$

$x = 13 \quad y = 3$

$y = -3$

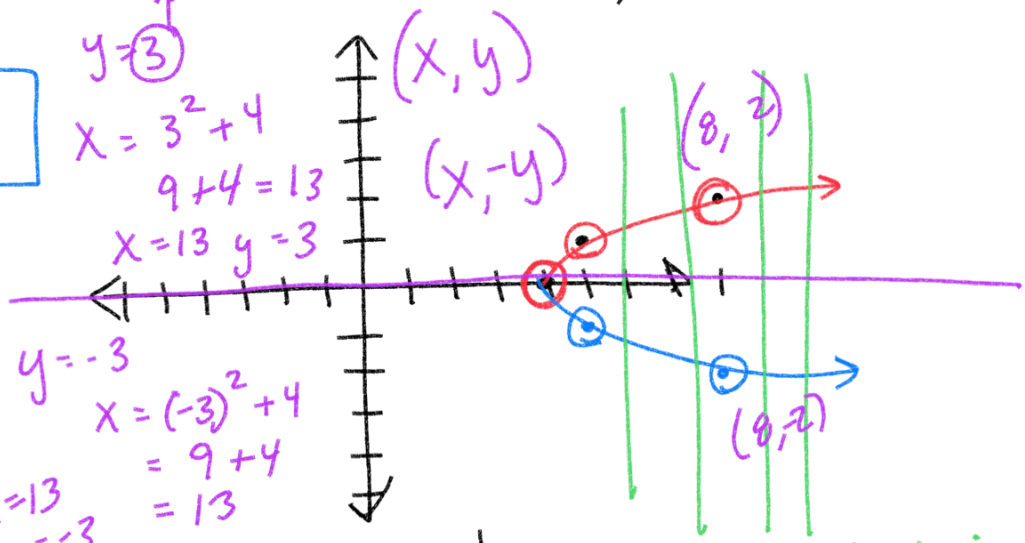
$x = (-3)^2 + 4$

$= 9 + 4$

$= 13$

$x = 13$

$y = -3$



symmetry about x-axis

vertical line test

not functn w/ respect to x

$x = 0 \quad \sqrt{0-4} = \sqrt{-4} = 2i$

$x = 3 \quad \sqrt{3-4} = \sqrt{-1} = i$

$x = 4 \quad \pm\sqrt{4-4} = \sqrt{0} = 0 \quad (4,0)$

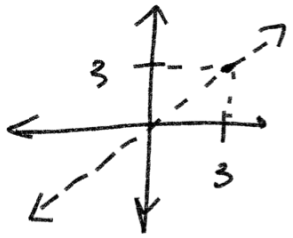
$x = 5 \quad \sqrt{5-4} = \sqrt{1} = 1 \quad (5,1) \; (5,-1)$

$x = 8 \quad \sqrt{8-4} = \sqrt{4} = 2 \quad (8,2) \; (8,-2)$

Even - Odd functions

Even function → symmetry about y-axis

Odd function → symmetry about x=y axis



$y = x^{2} + 4$ even

$x^2 + 4x^0$

$(2)^2 + 4$

$4 + 4 = 8$

$(-2)^2 + 4$

$4 + 4 = 8$

$f(x) = f(-x)$

$f(2) = f(-2)$

odd function

$f(-x) = -f(x)$

$y = x^3$ ← odd

$(-2)^3 = -8$

$f(-x) = -8$

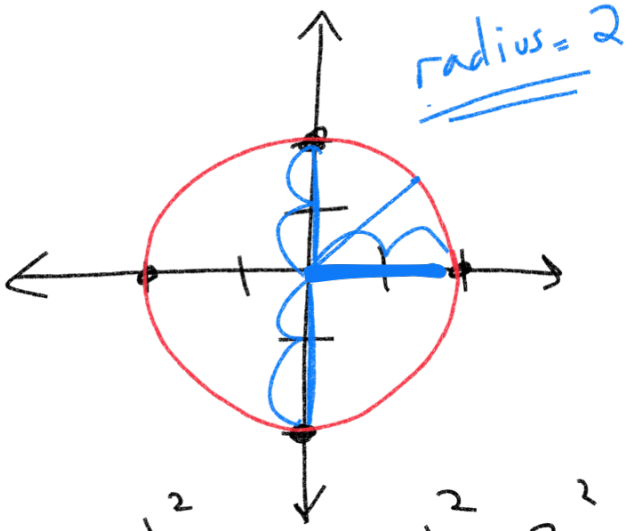
$(2)^3 = 8 \quad -f(x) = -8$

Equation for a circle

$$(x-h)^2 + (y-k)^2 = r^2$$

center (h, k)

$$\begin{cases} x^2 + y^2 = 4 \end{cases}$$



$x = 0$ $\sqrt{y^2} = \sqrt{4} = \pm 2$

$(0, 2)$ & $(0, -2)$

$y = 0$ $\sqrt{x^2} = \sqrt{4} = \pm 2$

$(2, 0)$ & $(-2, 0)$

$(x-0)^2 + (y-0)^2 = 2^2$

center $\{(0, 0)\}$ radius 2

Center $(5, 7)$

radius 9

$$(x-h)^2 + (y-k)^2 = r^2$$

$$(x-5)^2 + (y-7)^2 = 9^2$$

$$(x-5)^2 + (y-7)^2 = 81$$

$$(x-2)^2 + (y+5)^2 = 49$$

center $(2, -5)$ radius $= \sqrt{49} = 7$

$$x^2 + y^2 - 10x - 14y - 7 = 0$$

$$(x-h)^2 + (y-k)^2 = r^2$$